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Research Article

Efficacy of Oral Domperidone Vs. Metoclopramide in Preventing Postoperative Nausea and Vomiting After Total Abdominal Hysterectomy

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Abstract
Postoperative nausea and vomiting (PONV) is still a common implication after surgery, especially in high risk procedures such as total abdominal hysterectomy. Dopamine D2 receptor antagonists generally used for PONV prevention include metoclopramide and domperidone both because of their antiemetic and prokinetic effects. This study was undertaken to determine whether oral domperidone and metoclopramide are equally effective and safe in preventing PONV in patients undergoing total abdominal hysterectomy under general anesthesia. A prospective, randomized study was performed in 50 female patients 16–70 years of age undergoing surgery. Participants were randomly assigned to one of 10 mg of oral domperidone or 10 mg of metoclopramide preoperatively, and received 10 mg of oral domperidone or 10 mg of metoclopramide preoperatively. The primary outcome was incidence of nausea and vomiting up to 24 hours postoperatively. Secondary outcomes included adverse effects and need for rescue antiemetics. The results showed no statistically significant difference between the two groups in PONV incidence (32% for domperidone and 28% for metoclopramide, p=0.7576). Nausea was reported in 20% of patients in the domperidone group and 16% in the metoclopramide group, while vomiting occurred more frequently in the domperidone group (28% vs. 16%) during the first 6 hours. Mild adverse effects such as headache and dizziness with both medications were well tolerated. Similarly, oral domperidone and metoclopramide both effectively prevent PONV after total abdominal hysterectomy, and are cost-effective and practical, especially in resource-limited settings.

Keywords: Postoperative nausea and vomiting, domperidone, metoclopramide, total abdominal hysterectomy, antiemetic therapy.

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Introduction

PONV remains a major problem in modern anesthesia and perioperative care. Although PONV has been reduced with advances in surgical techniques, anesthetic agents, and patient management strategies, PONV remains a problem in about 20–30% of all surgical

patients, and up to 50% in high-risk patients (Gan et al., 2014). In particular, these rates are very high in certain surgical procedures, including gynecologic, laparoscopic, and abdominal surgeries. It is also well known that PONV has a huge impact on patient comfort and dissatisfaction, as well as adding to healthcare costs through increases in hospital stay, delayed discharge, and additional treatment necessary (Apfel et al., 2012). PONV is multifactorial pathophysiology with complex interaction among neurotransmitters, receptors, and autonomic nervous system (Shaikh et al., 2016). Key neurotransmitters in the development of PONV are dopamine, serotonin, histamine and acetylcholine (Denholm & Gallagher, 2018). Activity in the vomiting center in the medulla and the chemoreceptor trigger zone (CTZ) is central regulation of nausea and vomiting (Horn et al., 2014). The incidence of PONV is variable and is based on surgical factors (longer operative time), anesthetic factors (use of volatile anesthetics and nitrous oxide), and patient factors (female gender, history of motion sickness, nonsmoking status) (Khan & Hadi, 2021). Despite developing antiemetic therapies, PONV is not yet adequately treated with a single agent. Currently, the management of PONV involves a multimodal approach using pharmacological agents of multiple receptor pathways along with perioperative measures including adequate hydration and the use of regional anesthesia when feasible (Elvir-Lazo et al., 2020; Kranke et al., 2020). Metoclopramide and domperidone are long-established components of antiemetic regimens because of their efficacy, affordability, and availability.

The most widely used agent for PONV prevention, discovered in the 1960s, is metoclopramide. Metoclopramide is a dopamine D2 receptor antagonist that additionally blocks serotonergic receptors and thereby acts in two sites, the chemoreceptor trigger zone (CTZ) and part of the peripheral gastrointestinal system, to block nausea and vomiting (Zheng et al., 2021). In addition, its prokinetic properties, i.e., enhancement of gastric emptying and reduction of gastroparesis, are of benefit in postoperative settings where delayed gastric motility is common (Zeb et al., 2020). Metoclopramide shares central nervous system side effects with other medications used for this purpose such as sedation and extrapyramidal symptoms, and therefore, does not have widespread use in certain patient populations (Cavero-Redondo et al., 2015). Another antiemetic dopamine D2 receptor antagonist is domperidone first synthesized in 1974. The blood-brain barrier is not easily crossed by doperidone., much less than metoclopramide, which reduces the risk of central adverse symptoms such as extrapyramidal responses and sedation. The primary site of action of domperidone is in the peripheral gastrointestinal tract, there where it increases the motility of the gastric and decreases the nausea against delayed gastric emptying (Puoti et al., 2023). Although domperidone is generally as effective as metoclopramide in controlling nausea, it may be less effective in preventing vomiting in the early postoperative period (Heckroth et al., 2021). In resource-limited settings, its safety profile and availability in oral formulations (tablets, syrups, and chewable forms) make it a valuable option for PONV management. PONV can now be prevented with the help of neurokinin-1 (NK1) receptor antagonists like aprepitant and serotonin receptor antagonists like ondansetron, but their high cost limits their widespread use in many clinical settings, especially in developing countries (Meyer et al., 2023). In this setting, domperidone and metoclopramide remain cost-effective and available options for PONV management. Practical advantages of these agents, particularly when administered orally, have been highlighted in comparative studies as preoperative prophylaxis (Weibel et al., 2020).

Despite the many pharmacological options for PONV prevention, in postoperative treatment, particularly for patients having high-risk surgery, for example, total abdominal hysterectomy. Incidence of PONV in this population is influenced by surgical manipulation of abdominal organs, use of volatile anesthetics and paralytic ileus postoperatively. There are few data on the efficacy and safety of metoclopramide and domperidone when given orally in the preoperative period, both are effective antiemetics. There is no clear evidence to guide clinical decision making in this patient population and more research is needed to determine the optimal antiemetic for this patient population.

Research Objective

The aim of this study is to compare the safety and efficacy between oral domperidone, metoclopramide on reducing postoperative nausea and vomiting (PONV) in patients who had undergone total abdominal hysterectomy general anesthesia. The incidence of nausea and vomiting and the associated adverse effects are evaluated in this high risk surgical group to provide evidence based recommendations for antiemetic prophylaxis. Finally, the study also reviews the practical benefits of oral formulations, especially in resource limited settings, and their potential for inclusion in multimodal PONV prevention strategies.

Materials and Methods

Study Design and Participants

This was a prospective and randomized comparative study. The study was comprised of 50 female patients aged 16 to 70 years, ASA (American Society of Anesthesiologists) grade I and II, planned for total abdominal hysterectomy under general anesthesia.

Inclusion Criteria

The study population was female patients aged 16 to 70 years ASA I or II (normal healthy status or mild systemic disease with no functional limitation). Postoperative nausea and vomiting (PONV) is a common complication of total abdominal hysterectomy and all participants were planned for under general anaesthesia. This led to a homogeneous group of patients who could be best assessed for the efficacy of the interventions while controlling for confounding variables based on common demographics or surgical procedures.

Exclusion Criteria

Patients with a history of gastroesophageal reflux disease acid peptic disease, or conditions predisposing them to PONV, including migraine, motion sickness, or prior irradiation, were excluded. To avoid adverse drug reactions, those with known hypersensitivity to domperidone or metoclopramide were excluded. Patients with significant cardiovascular, pulmonary, renal, hepatic, neurological, or endocrine abnormalities were excluded because such conditions may affect the perioperative course, interfere with the effects of the study drugs, or pose an unnecessary risk to the patient during the study.

Study Groups and Intervention

To compare unbiased, participants were randomly assigned to one of two study groups. Group A received oral domperidone 10 mg at bedtime on the night before surgery and again 3 hours before surgery. Oral metoclopramide 10 mg was given to Group B on the same schedule. The patients were given both medications as syrup or tablets according to their preference for comfort and compliance. By standardizing the dosing schedule, the efficacy of preventing postoperative nausea and vomiting with that of both drugs could be consistently evaluated.

Anesthetic Protocol

All participants had a standardized anesthetic protocol. Induction consisted of glycopyrrolate 0.2 mg, ranitidine hydrochloride 50 mg intravenously, and buprenorphine 4 mcg/kg intravenously, all given just before induction. To simplify tracheal intubation, suxamethonium 1–1.5 mg/kg was administered in conjunction with thiopentone sodium 5 mg/kg to induce anesthesia. 70% nitrous gas in oxygen was used to maintain anesthesia, with vecuronium bromide in intermittent dosages as a supplement. Intrapatient monitoring was thorough, and consisted of noninvasive blood pressure (NIH), pulse oximetry, and electrocardiogram (ECG) to help guarantee the patient's stability and safety.

Postoperative Management

To reverse neuromuscular blockade, atropine 0.025 mg/kg, or glycopyrrolate 0.01 mg/kg was used after surgery, and neostigmine 0.05 mg/kg was used. Once adequate and confirmed, spontaneous ventilation was adequate patients were safely extubated and transferred to the postoperative ward for supplemental care. With this protocol, there was a smooth recovery from anesthesia and patient safety during the extremely sensitive postoperative period.

Outcome Measures

The primary objective of this research was to determine the prevalence and intensity of postoperative nausea and vomiting (PONV) in the first 24 hours following surgery at two different time points: 0–6 hours and 6–24 hours. PONV severity was categorized as follows: The absence of any emetic episode or nausea was indicated by No PONV, mild PONV was defined as mild nausea or a single emetic episode lasting less than 10 minutes triggered by an external stimulus without the need for antiemetics, severe PONV involved more than two episodes of vomiting, while moderate PONV involved one to two episodes of vomiting or moderate to severe nausea without provocation that necessitated antiemetic therapy once. Secondary outcomes included rescue antiemetic use, headache, dizziness or extrapyramidal symptoms, hemodynamic stability, and return of bowel activity.

Data Collection

Baseline demographics (age and weight) and clinical parameters (heart rate, blood pressure, laboratory investigations) were obtained preoperatively. This made it possible to identify any pre-existing conditions and enable a standardized comparison between the study groups. Patients were monitored after surgery for any episodes of nausea, vomiting, or discomfort during the first 24 hours following surgery. The requirement for rescue antiemetics and analgesics was carefully noted to assess the efficacy of the administered drugs and to assess overall patient management during the recovery period.

Statistical Analysis

The incidence of nausea and vomiting in the two study groups was compared using statistical analysis. As Fisher's exact test is appropriate for small sample sizes and categorical data, it was used. The statistical significance of differences in outcomes between the groups was determined using a p-value of < 0.05 as statistically significant.

Ethical Approval

All participants provided written consent for this study, which was authorized by the hospital ethics committee.

Results

Study Population

The trial had 50 patients in total, with 25 patients assigned to each group. Group A received oral domperidone (10 mg) at bedtime on the night before surgery and again 3 hours before surgery, while Group B received oral metoclopramide (10 mg) on the same schedule. All patients completed the study without any dropouts. Table 1 provides a summary of the patients' baseline demographic and anesthetic characteristics in both groups. The study population was homogeneous because there were no statistically significant variations between the groups in terms of age, weight, length of surgery, or period of anesthesia.

Table 1: Demographic and Anesthetic Data

Patient characteristics	Mean Group A	Mean Group B	SD Group A	SD Group B	P value
Age	46.04	44.48	7.5	6.38	0.4322
Weight	53.28	58.56	10.30	10.84	0.0838
Duration of anesthesia(min)	122.4	123.6	31.86	22.66	0.8787
Duration of surgery(min)	112	109.84	31.52	26.67	0.7948

Incidence of Postoperative Nausea and Vomiting (PONV)

The incidence of postoperative nausea and vomiting (PONV) in the first 24 hours after surgery was the study's main endpoint. In all, PONV affected 28% of patients in the metoclopramide group (Group B) and 32% of individuals in the domperidone group (Group A). Table 2 indicates that this difference was not statistically significant (p = 0.7576).

Table 2: Incidence of Postoperative Nausea and Vomiting in the First 24 Hours

Post-operative nausea and vomiting	Group A (Domperidone)	Group B (Metoclopramide)
Present	8(32%)	7(28%)
Absent	17(68%)	18(72%)
Total	25	25

Incidence of Nausea

The incidence of nausea was analyzed for the entire 24-hour postoperative period and separately for two time intervals: 0–6 hours and 6–24 hours. The results are summarized in Table 3 for the 24 hours and in Tables 5 and 7 for the respective time intervals.

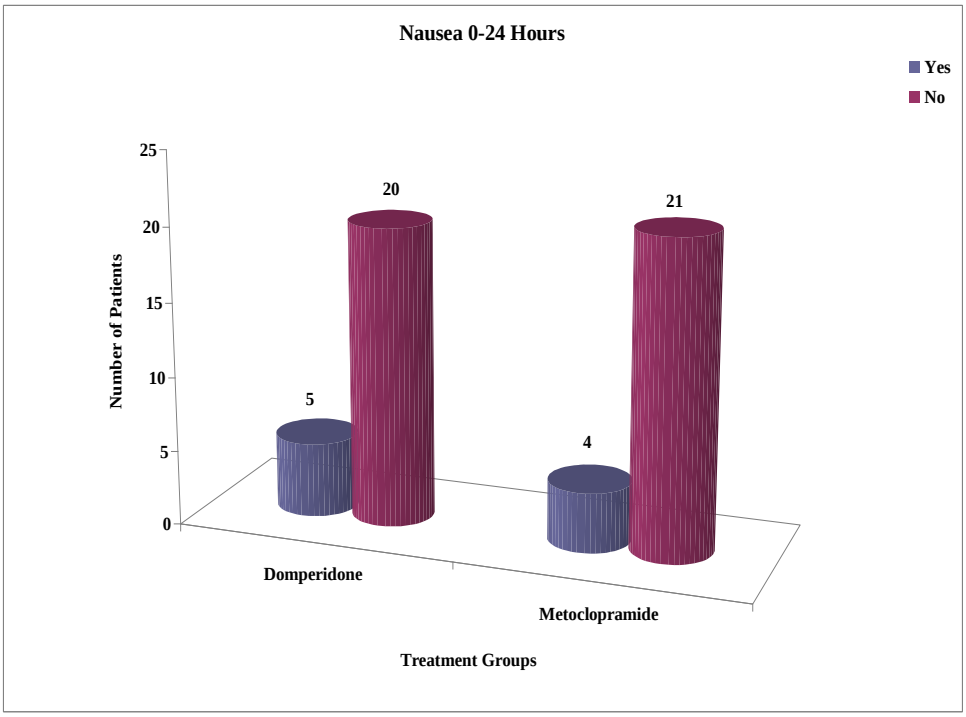

Figure 1: Incidence of Nausea in the First 24 Hours

The incidence of nausea during the first 24 hours postoperatively was slightly higher in Group A (domperidone) at 20% compared to 16% in Group B (metoclopramide) as shown in Figure 1. However, this difference was not statistically significant, with the majority of patients in both groups (80% in Group A and 84% in Group B) experiencing no nausea. These findings indicate that both domperidone and metoclopramide are effective in minimizing postoperative nausea, with no significant advantage of one drug over the other during this period.

Table 4: Incidence of Nausea in 0–6 Hours Postoperatively

Nausea	Group A Domperidone	Group B Metoclopramide
Present	5(20%)	4(16%)
Absent	20(80%)	21(84%)
Total	25	25

Nausea occurred in 20 percent of patients in Group A (domperidone) and 16 percent of patients in Group B (metoclopramide) during the first 6 hours postoperatively as represented in Table 4. Nausea was experienced by less than 20% of patients in both groups (Group A 80%, Group B 84%). Neither medication was significantly different from the other in controlling nausea in the early postoperative period. Most patients tolerated both drugs well and were effective in preventing nausea.

Table 5: Incidence of Nausea in 6–24 Hours Postoperatively

Nausea	Group A Domperidone	Group B Metoclopramide
Present	4(16%)	3(12%)
Absent	21(84%)	22(88%)
Total	25	25

Table 5 showed that nausea occurred during the 6–24 hours postoperative period in 16% of patients in Group A (domperidone) and 12% of patients in Group B (metoclopramide). Nausea was not experienced by the majority of patients in both groups (84% in Group A and 88% in Group B). Between the two groups, there was no statistically significant difference in the efficacy of domperidone versus metoclopramide in controlling nausea during this later postoperative phase. During this period, both drugs were effective in minimizing nausea in most patients.

Incidence of Vomiting

The incidence of vomiting followed a pattern similar to nausea. During the first 24 hours postoperatively, 28% of patients in the domperidone group and 24% in the metoclopramide group experienced vomiting. These results were not statistically significant ($p = 0.7471$), as shown in Table 6.

Table 6: Incidence of Vomiting in the First 24 Hours

Vomiting	Group A Domperidone	Group B Metoclopramide
Present	7(28%)	6(24%)
Absent	18(72%)	19(76%)
Total	25	25

Table 7: Incidence of Vomiting in 0–6 Hours Postoperatively

Vomiting	Group A Domperidone	Group B Metoclopramide
Present	7(28%)	4(16%)
Absent	18(72%)	21(84%)
Total	25	25

Table 7 shows Group A (domperidone) patients, vomiting occurred in 28% of patients in the first 6 hours postoperatively, and in Group B (metoclopramide) patients, it occurred in 16%. Most patients in both groups did not throw up (72% in Group A and 84% in Group B). Vomiting was more common in the domperidone group, though not substantially so. These results indicate that metoclopramide may have a very small advantage in preventing vomiting in the early postoperative period.

Table 8: Incidence of Vomiting in 6–24 Hours Postoperatively

Vomiting	Group A Domperidone	Group B Metoclopramide
Present	3(12%)	4(16%)
Absent	22(88%)	21(84%)
Total	25	25

During the 6–24 hours postoperative period, vomiting was reported in 12% of patients in Group A (domperidone) and 16% in Group B (metoclopramide) as shown in Table 8. The majority of patients in both

groups (88% in Group A and 84% in Group B) did not experience vomiting. The difference in vomiting incidence between the two groups was not statistically significant. These findings suggest that both domperidone and metoclopramide are comparably effective in preventing vomiting during the later postoperative period, with minimal occurrences overall.

Discussion

The objective of this study was to compare the comparative efficacy and safety of oral domperidone and metoclopramide in preventing postoperative nausea and vomiting (PONV) in patients who underwent total abdominal hysterectomy under general anesthesia. PONV is the most common and distressing complication of surgery, and second to postoperative pain as a patient concern. Despite the improvements in anesthesia and antiemetic therapies, the incidence of PONV is as high as 25 - 55%, even in abdominal surgery. This study shows evidence of these two widely used antiemetics' efficacy, safety, and clinical applicability in preventing PONV in a specific surgical setting.

With no statistically significant difference between domperidone and metoclopramide, both drugs significantly reduce the incidence of PONV in this study. There was no difference in the overall incidence of PONV between the domperidone and metoclopramide groups during the first 24 hours postoperatively (32% vs 28%; p=0.7576), indicating similar efficacy of the two drugs during this period. Nausea within the 24 hours observation period was found in 20% in the domperidone group and in 16% in the metoclopramide group (p=1). While the domperidone group had a slightly higher frequency of vomiting during the first 6 hours (28% vs. 16%), both groups were equivalent at 12% in the domperidone group and 16% in the metoclopramide group at 6–24 hours. The drugs were well tolerated with only mild adverse effects, headache and dizziness, and no extrapyramidal symptoms were seen. The results support the safety and efficacy of these medications for prevention of PONV, and a cost effective and practical means of routine use in clinical settings.

The findings of this study are in agreement with previous studies of the effectiveness of metoclopramide and domperidone in reducing postoperative nausea and vomiting (PONV). This drug is a dopamine and serotonin receptor antagonist; Metoclopramide, which has been widely used over the past decades. Studies by Golembiewski, (2014), showed effectiveness at a dose of 10 mg to reduce PONV. In addition, prokinetic properties impart further prokinetic properties which further speed up gastric emptying and so ameliorate the associated nausea and vomiting in gastroenteritis (Hasler, 2016). In this study, domperidone and metoclopramide were equally effective in preventing nausea but domperidone was less effective in preventing vomiting during the early postoperative period, as was also found in a study (Orhan et al., 2024). Additional prokinetic properties of domperidone, that aid in postoperative recovery and oral intake (Maheshwari & Sood, 2023). Highly effective newer antiemetics are the serotonin (5-HT3) receptor antagonists (e.g., ondansetron), but their high cost make them impractical, especially in resource limited settings (Smith et al., 2020). Several decades of evidence exist that domperidone and metoclopramide are still cost effective and available substitutes in the treatment of severe nausea and vomiting. Both drugs are equally safe, effective and cost effective, and useful for the management of PONV. In future studies, they could be studied as part of combined multimodal therapy with newer agents. The implications of this study are especially important in resource limited health care settings. Less expensive prophylactic antiemetics, oral domperidone and metoclopramide, are used instead of newer, more expensive agents like ondansetron and aprepitant (Fujii et al., 2017). In addition, both drugs have additional benefits with oral formulations including ease of administration, patient comfort and compliance. In addition, these drugs have similar efficacy and acceptable safety profiles and could be included in standard preoperative protocols for PONV prophylaxis. The results also highlight the importance of timing of drug administration, with preoperative doses given the evening before surgery and 3 hours before surgery, which maximizes the effect of the drugs and reduces the potential for drug interaction with anesthetic agents.

This study has its strengths but also has its limitations. While the results were obtained from 50 patients, limitations of generalizability may be a function of the small sample size, especially regarding different risk factors and populations for PONV. The results are further restricted to the applicability to other clinical settings by the single-center design. The study also didn't include a placebo group, allowing for less absolute efficacy of the two drugs. Additionally, it was not fully evaluated as to whether patient satisfaction and quality of recovery would improve with different strategies for PONV management. Thus, these limitations in future studies need to be addressed with larger multicenter trials and patient-reported outcomes. Further research should of course focus on larger-scale studies comparing domperidone and metoclopramide with newer antiemetics such as serotonin receptor antagonists or neurokinin-1 receptor antagonists. Combination therapies of these drugs with other agents could be investigated to identify multimodal approaches to PONV prevention. Additionally, the use of these medications in addition to nonpharmacological interventions including acupuncture or transcutaneous nerve stimulation may produce more synergistic effects. Pharmacogenomic aspects of PONV susceptibility and drug response may also lead to personalized strategies for antiemetic therapy. Long-term studies evaluating patient satisfaction, cost-effectiveness, and quality of recovery after the use of these drugs would better elucidate their clinical utility.

Conclusion

In this study, the efficacy and safety of oral domperidone vs. metoclopramide in the prevention of postoperative nausea and vomiting (PONV) following total abdominal hysterectomy under general anesthesia were compared.

Both medications reduced PONV equally with no difference between the two groups. There was no clinical significance of the difference in incidence of PONV in the domperidone group (32%) vs the metoclopramide group (28%), p=0.7576. There were no meaningful differences between groups about nausea and vomiting rates in the first 6 hours and 6–24 hours postoperatively. Both medications caused minimal adverse effects. Headache and dizziness were mild and infrequent and no extrapyramidal symptoms were reported. Domperidone is suitable for patients at risk of central nervous system side effects because it cannot cross the blood-brain barrier. In addition, the use of oral formulations for both medications further emphasizes their convenience and applicability in routine clinical settings, especially in resource-poor settings. The findings of this study agree with the existing literature in that metoclopramide and domperidone are both effective and cost-effective PONV prevention methods, and are widely available. Newer agents, such as serotonin receptor antagonists, are more efficacious but are too costly, and domperidone and metoclopramide are practical alternatives, especially when given preoperatively. Future research should enlarge to larger multicentre trials to investigate the feasibility of combining these agents with new antiemetics or nonpharmacological intervention for a well-targeted PONV management. Future pharmacogenomic studies that explore the role of metrics such as long-term outcomes (patient satisfaction, cost-effectiveness), can add more value to the clinical use of domperidone and metoclopramide to improve perioperative care.

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